

WHAT IS CLAIMED IS:

1. A method for manufacturing an FBAR based duplexer device comprising the steps of:

- 5 a) preparing a plurality of FBAR chips, each FBAR chip comprising a substrate, air gap and piezoelectric layer unit, which are successively arranged, a plurality of electrode pads electrically connected to the piezoelectric layer unit, and bump balls formed on the electrode pads in a one to one ratio;
- 10 b) preparing a duplexer substrate having a duplexing circuit;
- c) reversing a plurality of the FBAR chips after contacting them with the duplexer substrate so that the substrates of the FBAR chips face upward, and bonding the bump
- 15 balls to the duplexer substrate;
- d) forming protective structures by the use of a film, the protective structures being positioned on side surfaces as well as an upper surface of the respective FBAR chips; and
- e) forming a molding portion on the duplexer substrate so
- 20 as to cover the protective structures.

2. The method as set forth in claim 1, wherein the step a) includes the steps of:

- a-1) dividing an FBAR chip substrate wafer into a
- 25 plurality of wafer sections by the use of vertical and

horizontal lines, and forming a plurality of sacrificial layer units on the divided wafer sections, respectively;

a-2) forming the piezoelectric layer units on the sacrificial layer units, respectively;

5 a-3) forming a plurality of the electrode pads on each wafer section, the electrode pads being electrically connected to the piezoelectric layer unit of the corresponding wafer section;

10 a-4) forming the air gaps by removing the sacrificial layer units;

a-5) forming the bump balls on the electrode pads in a one to one ratio; and

15 a-6) cutting the FBAR chip substrate wafer into the divided wafer sections, thereby obtaining a plurality of the individual FBAR chips.

3. The method as set forth in claim 1, wherein the step d) includes the steps of:

20 d-1) laminating a dry film on an overall surface of the duplexer substrate and hence the FBAR chips; and

d-2) removing unnecessary portions of the dry film laminated on the duplexer substrate.

25 4. The method as set forth in claim 1, wherein the duplexer substrate is made of PCB sheets.

5. The method as set forth in claim 3, wherein the dry film is an insulation film including a photosensitive polymer film or a non-photosensitive polymer film.

5         6. The method as set forth in claim 3, wherein the step d-2) includes the steps of:

        d-2-1) exposing the unnecessary portions of the dry film to be removed to a light, through the use of a mask; and

        d-2-2) removing the exposed portions of the dry film by  
10 simultaneously applying a chemical process using a developer solution and a physical process using high pressure dispensing.

7. An FBAR based duplexer device comprising:

        a PCB substrate having a duplexing circuit;

15         a plurality of FBAR chips, each comprising an FBAR chip substrate, an air gap defined at a lower surface of the FBAR chip substrate, a piezoelectric layer unit formed under the air gap, a plurality of electrode pads provided at a lower side of the FBAR chip substrate so as to be electrically connected to  
20 the piezoelectric layer unit, and a plurality of bump balls formed on a lower side of the electrode pads so as to be bonded to an upper surface of the PCB substrate;

        protective structures made of a film, the protective structures being laminated on the PCB substrate so as to cover  
25 side surfaces and upper surfaces of the respective FBAR chips;

and

a molding portion formed on the PCB substrate so as to completely cover the protective structures.

5           8. The device as set forth in claim 7, wherein the protective structures are made of an insulation film including a photosensitive polymer film and a non-photosensitive polymer film, and laminated on the PCB substrate by using a vacuum deposition.

10